

CLAIMS

1. In combination:

detector means for receiving a first signal which travels along a first propagation path and a second signal which travels along a second propagation path, a portion of said first and second propagation paths being located in the same propagation medium, wherein said first signal has a primary signal portion and a secondary signal portion and said second signal has a primary signal portion and a secondary signal portion; and

first signal processor means having input means for receiving said first and second signals and combining said first and second signals for generating either a primary or secondary reference signal having a significant component which is a function of either of, respectively, said primary or said secondary signal portions of said first and second signals.

2. The combination recited in claim 1, further comprising second signal processor means for receiving said secondary reference signal and said first signal and for deriving therefrom an output signal having a significant component which is a function of said primary signal portion of said first signal.

3. The combination recited in claim 2, wherein said second signal processor means includes a correlation canceler.

4. The combination recited in claim 2, wherein said second signal processor means includes an adaptive noise canceler.

5. The combination recited in claim 4, wherein said adaptive noise canceler includes a joint process estimator.

6. The combination recited in claim 5, wherein said joint process estimator comprises a least-squares lattice predictor and a regression filter.

7. The combination recited in claim 1, further comprising second signal processor means for receiving said primary reference signal and said first signal and for deriving therefrom an output signal having a significant component which is a function of said secondary signal portion of said first signal.

06443514-100697

8. The combination recited in claim 1, further comprising second signal processor means for receiving said secondary reference signal and said first signal and for deriving therefrom an output signal having a significant component which is a function of said primary signal portion of said second signal.

9. The combination recited in claim 1, further comprising second signal processor means for receiving said primary reference signal and said first signal and for deriving therefrom an output signal having a significant component which is a function of said secondary signal portion of said second signal.

10. The combination recited in claim 1, wherein said detector means includes a sensor for sensing a physiological function depending upon said first and second signals.

11. The combination recited in claim 10, wherein said sensor is adapted to measure a blood constituent.

12. The combination recited in claim 11, wherein the blood constituent measured by said sensor is blood gas.

13. The combination recited in claim 10, wherein said sensor includes a device that is responsive to electromagnetic energy.

14. The combination recited in claim 1, further comprising electromagnetic means connected to said detector means for measuring a plethysmographic waveform depending upon said first and second signals received by said detector means through said propagation medium, said propagation medium including living tissue.

15. The combination recited in claim 1, further comprising pulse oximeter means connected to said detector means for measuring a physiological condition depending upon said first and second signals received by said detector means through said propagation medium, said propagation medium including living tissue.

16. The combination recited in claim 1, further comprising blood pressure monitoring means connected to said detector means for measuring a physiological condition depending upon said first and second signals received by said detector means through said propagation medium, said propagation medium including living tissue.

17. The combination recited in claim 1, further comprising electrocardiogram means connected to said detector means for measuring a physiological condition depending upon said first and second signals received
5 by said detector means through said propagation medium, said propagation medium including living tissue.

18. The combination recited in claim 17, wherein said electrocardiogram means for measuring a physiological condition includes a tripolar electrode sensor having three concentrically arranged electrodes.

19. Apparatus for indicating the constituency of a material, said apparatus comprising:

first signal processor means for receiving first and second inputs, the first input comprising one of a
5 plurality of reference signals, each of said plurality of reference signals being related to the second input;

means for applying said second input and each of said plurality of reference signals to said first signal processor means; and

10 means for detecting the output signals of said first signal processor means for each of said plurality of reference signals applied to said signal processor means, wherein said output signals are indicative of the constituency of said material.

20. The apparatus recited in claim 19, wherein said first signal processor means is a correlation canceler.

21. The apparatus recited in claim 19, wherein said first signal processor means is an adaptive noise canceler.

22. The apparatus recited in claim 21, wherein said adaptive noise canceler comprises a joint process estimator.

23. The apparatus recited in claim 22, wherein said joint process estimator comprises a least-squares lattice predictor and a regression filter.

24. The apparatus recited in claim 19, further comprising second signal processor means receiving each of the output signals of said first signal processor means, said second signal processor means integrating each of said output signals for forming a cumulative output signal which is indicative of said integrated output signals.

25. The apparatus recited in claim 24, wherein said detecting means is responsive to the extremum of said cumulative output signal of said second signal processor means for providing an indication of the constituency of the material.

26. The apparatus recited in claim 24, wherein said detecting means is responsive to the inflections of said cumulative output signal of said second signal processor means for providing an indication of the constituency of the material.

27. The apparatus recited in claim 19, wherein said second input applied to said first signal processor means is one of a first or a second signal, each of said first and second signals having an arterial signal portion and another signal portion that is indicative of venous blood, and further comprising second signal processor means for receiving said first and second signals and a plurality of signal coefficients, wherein the output of said second signal processor means forms said first input applied to said first signal processor means, the output of said second signal processor means including a first component which is related to the arterial signal portions of said first and second signals and a second component which is related to the other signal portions of said first and second signals.

28. The apparatus recited in claim 27, wherein the other signal portion of each of said first and second signals includes an indication of human respiration.

29. The apparatus recited in claim 27, wherein at least one of said plurality of signal coefficients received by said second signal processor means relates to the arterial signal portions of said first and second signals of said second input to said first signal processor.

30. The apparatus recited in claim 27, wherein at least one of said plurality of signal coefficients received by said second signal processor means relates to the other signal portions of said first and second signals of said second input to said first signal processor means.

31. The apparatus recited in claim 19, wherein said second input applied to said first signal processor means is one of a first or a second signal, each of said first and second signals having an arterial signal portion and another signal portion that is indicative of venous blood, and further comprising second signal processor means for receiving said first and second signals and a plurality of signal coefficients, wherein the output of said second signal processor means forms said first input applied to said first signal processor means, the output of said second signal processor means including a component which is related to the arterial signal portions of said first and second signals or a component which is related to the other signal portions of said first and second signals.

32. The apparatus recited in claim 31, wherein the other signal portion of each of said first and second signals includes an indication of human respiration.

33. The apparatus recited in claim 19, wherein said material is human tissue.

34. The apparatus recited in claim 19, wherein said detecting means is responsive to the power of the output signals of said first signal processor means for indicating the constituency of said material.

35. Apparatus for computing arterial and venous signals in living tissue, said apparatus comprising:

5 detector means for receiving a first signal which travels along a first propagation path and a second signal which travels along a second propagation path, a portion of said first and second propagation paths being located in a propagation medium, wherein said first signal has an arterial signal portion that is indicative of arterial blood and another signal portion that is indicative of venous
10 blood, and said second signal has an arterial signal portion that is indicative of arterial blood and another signal portion that is indicative of venous blood; and

signal processor means having input means for receiving said first and second signals and combining said first and

second signals to generate a signal having a significant component which is a function of either of said arterial or said other signal portions of said first and second signal.

36. The apparatus recited in claim 35, wherein the other signal portion of each of said first and second signals includes an indication of human respiration.

37. Apparatus for computing arterial and venous blood constituent values in living tissue, said apparatus comprising:

5 signal processor means for receiving first and second inputs, a first of said inputs comprising one of a plurality of reference signals, each of said plurality of reference signals being related to the second input;

means for applying said second input and each of said plurality of reference signals of said first input to said
10 signal processor means; and

means for detecting the power of the output signals of said signal processor means for each of said plurality of reference signals of said first input, wherein said power is indicative of said arterial and venous blood constituent
15 values.

38. The apparatus recited in claim 37, wherein said arterial and venous blood constituent values are the oxygen saturation of arterial and venous blood, respectively.

Add.

B⁴.

add

B⁵